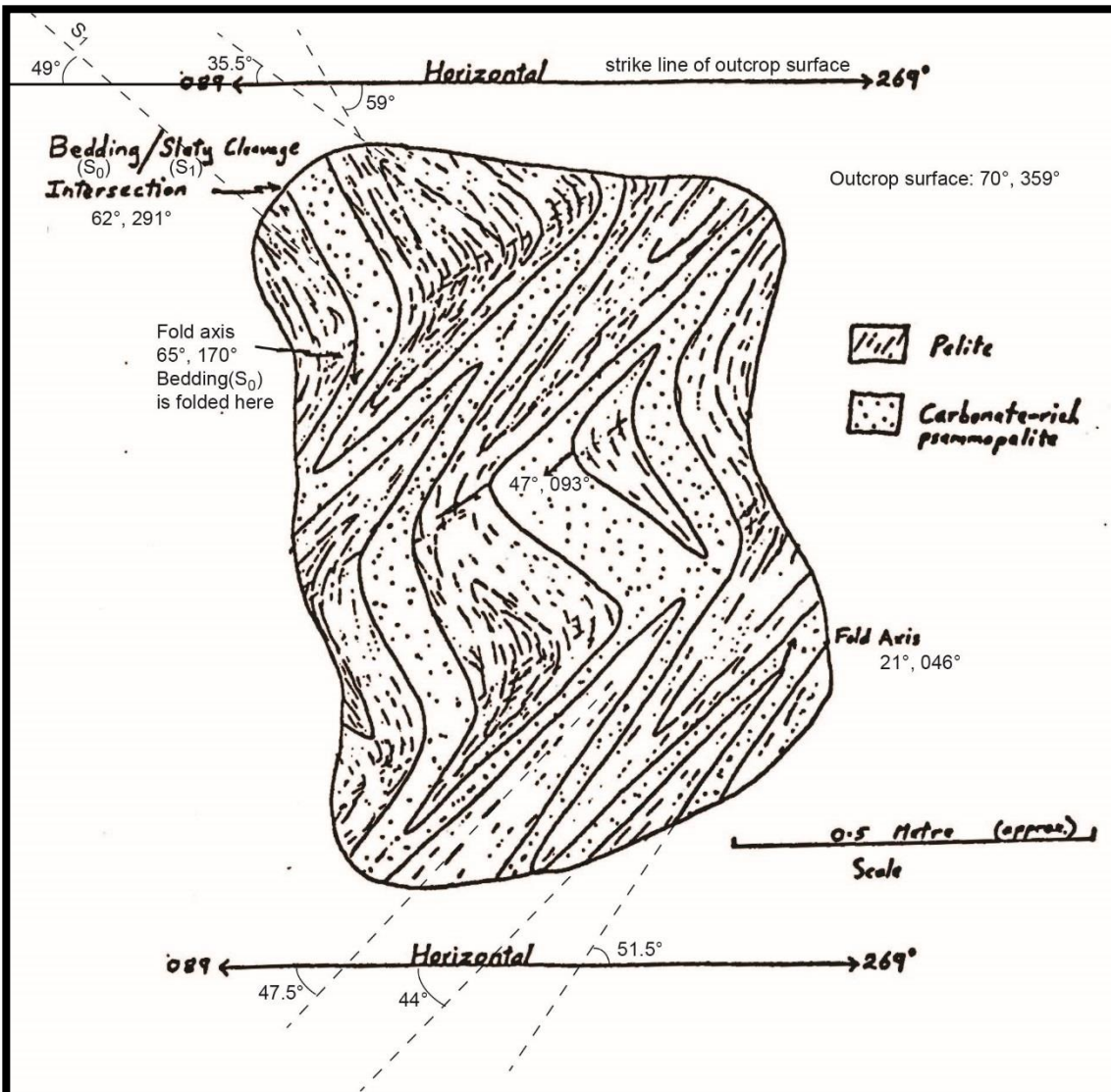# Lab 4

Geometry analysis of folds shown on a planar outcrop using equal-area projection

- A field sketch of a planar outcrop (outcrop surface: 70, 359) in which F_2 folds overprint F_1 folds. F_1 folds have a well developed slaty cleavage as an axial plane structure and before the F_2 deformation this strikes 360° (north-south).

- Use equal-area projection to determine the orientation of the two limbs of F_1 folds on different limbs of F_2 folds, and sketch F_1 profiles.

- F2 developed by flexural slip on the slaty cleavage. What were the orientations of F1 two limbs before F2 folding?
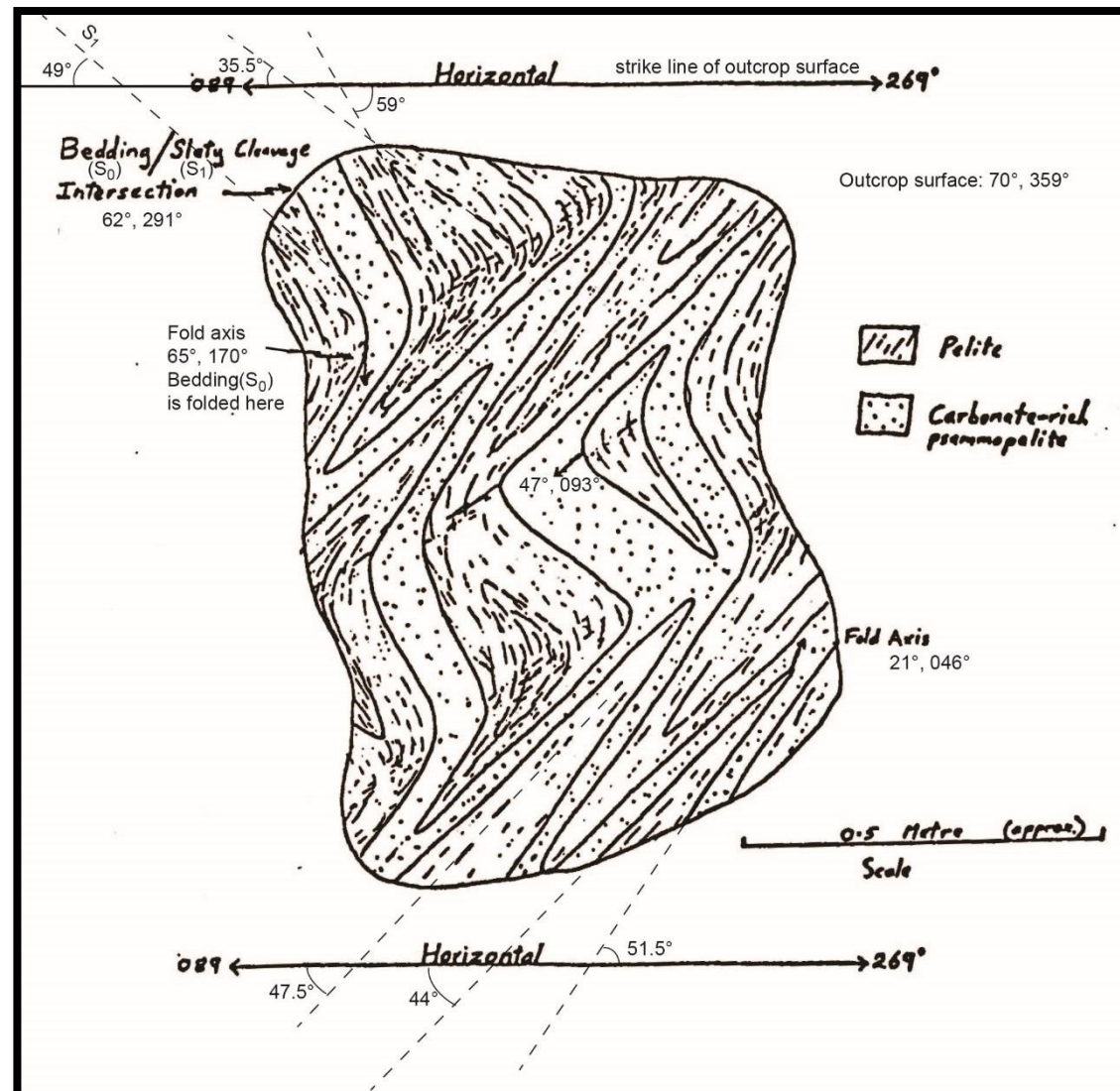
- Overprinting relationship?
- F_1? F_2?
- Folded surface of F_1?
- Axial surface of F_1?
- Fold axis (F_1? F_2?)
- Axial surface of F_2?
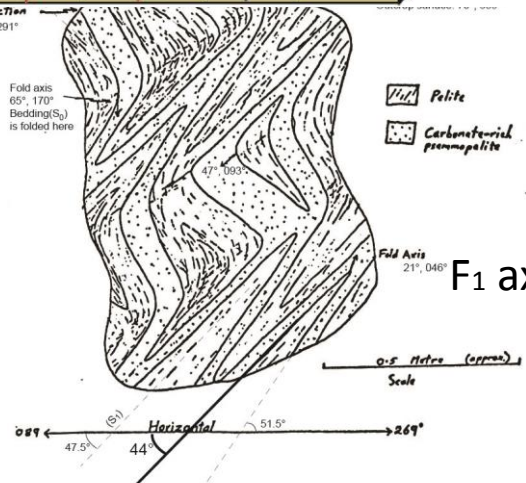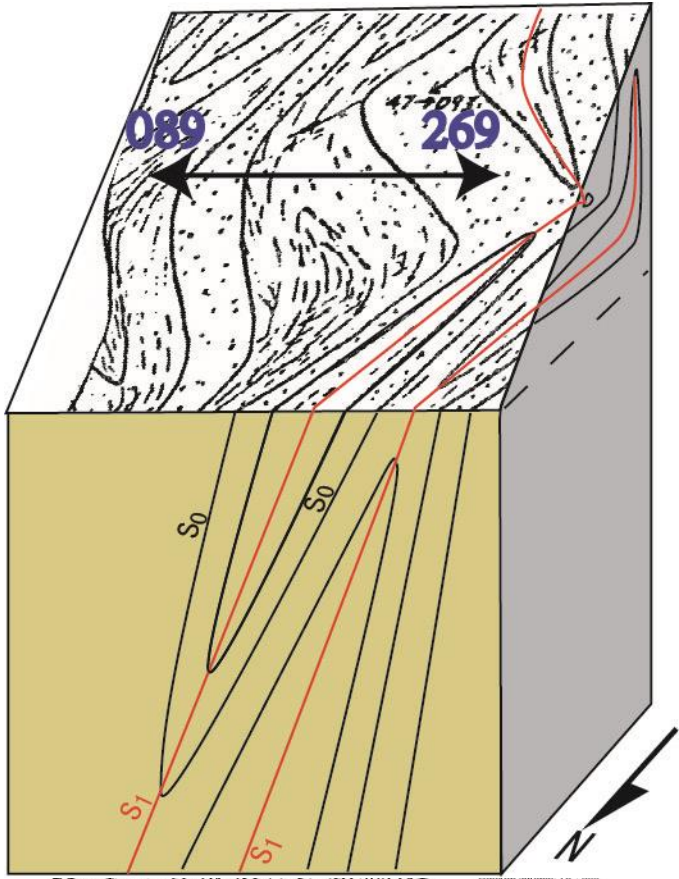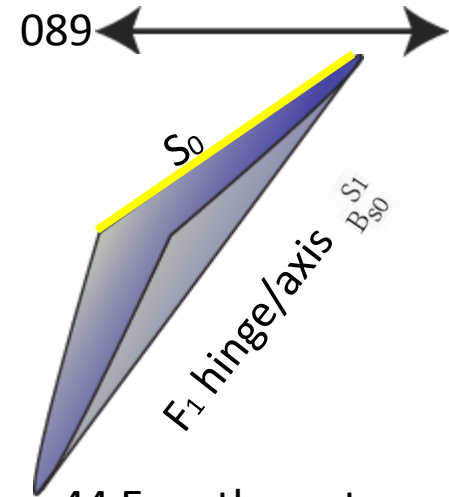
Bedding: S0. Slaty cleavage: S1
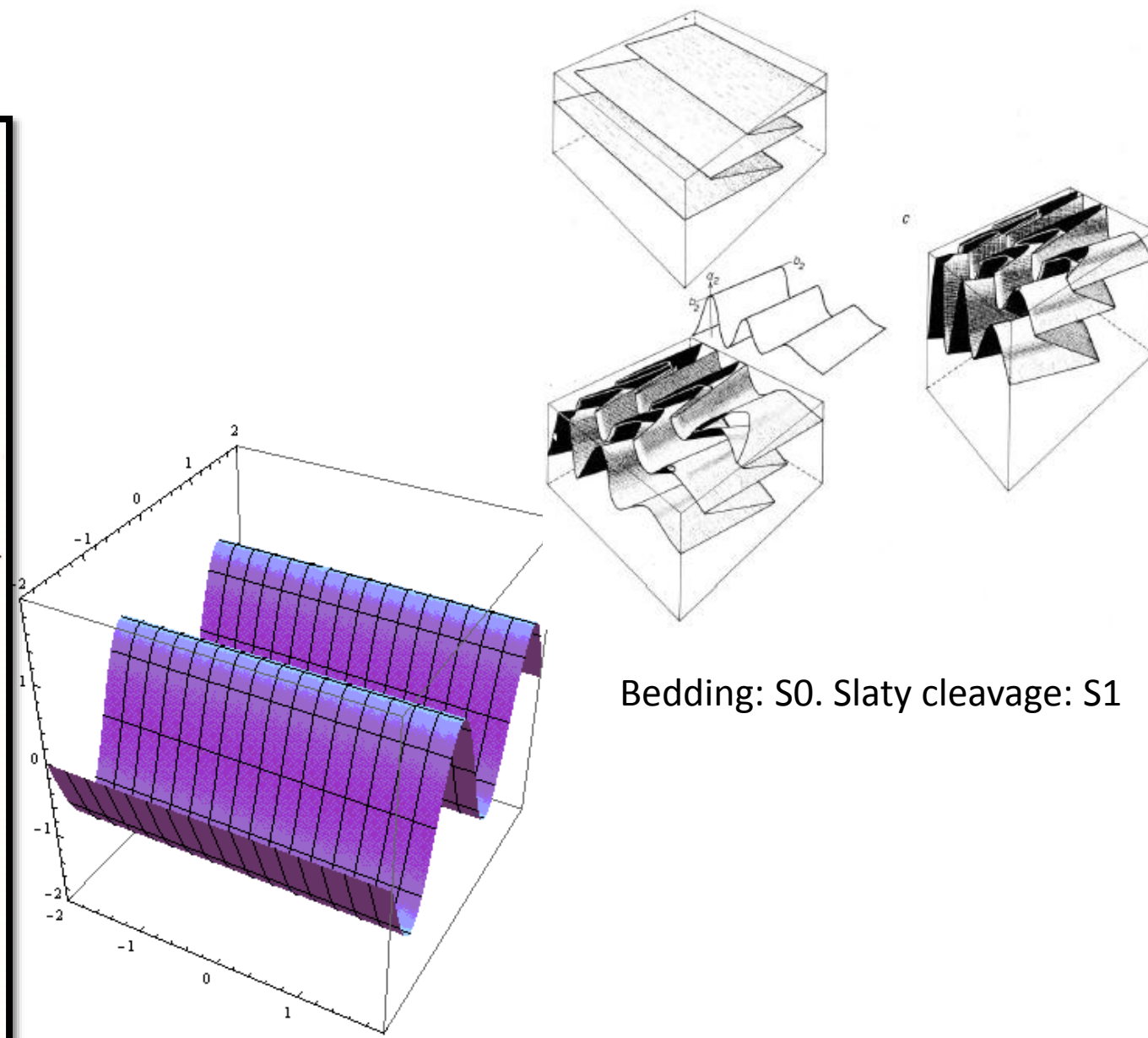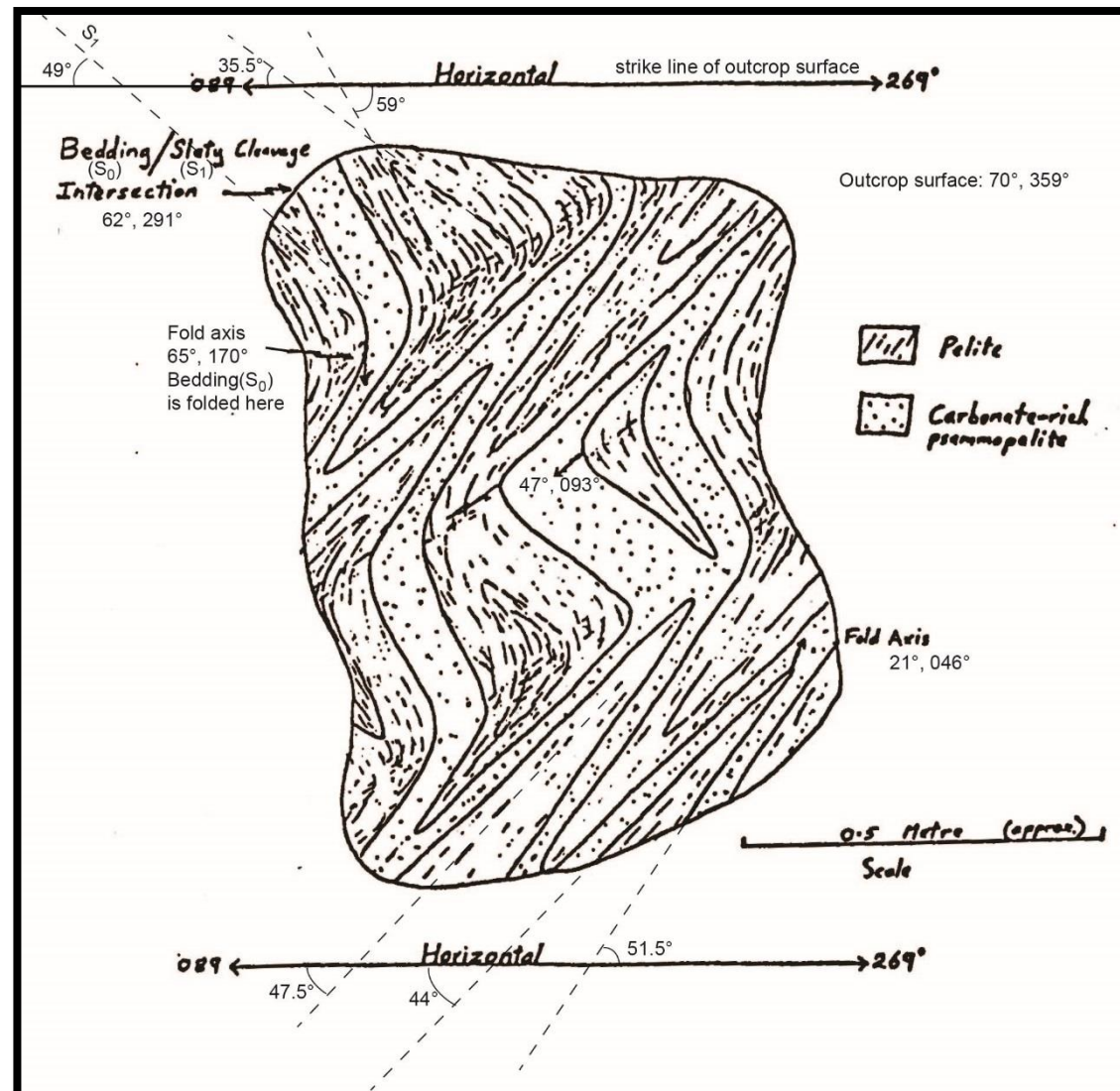
Distinguish F1 from F2

- Fold style:
  - Interlimb angle
  - Axial surface trace
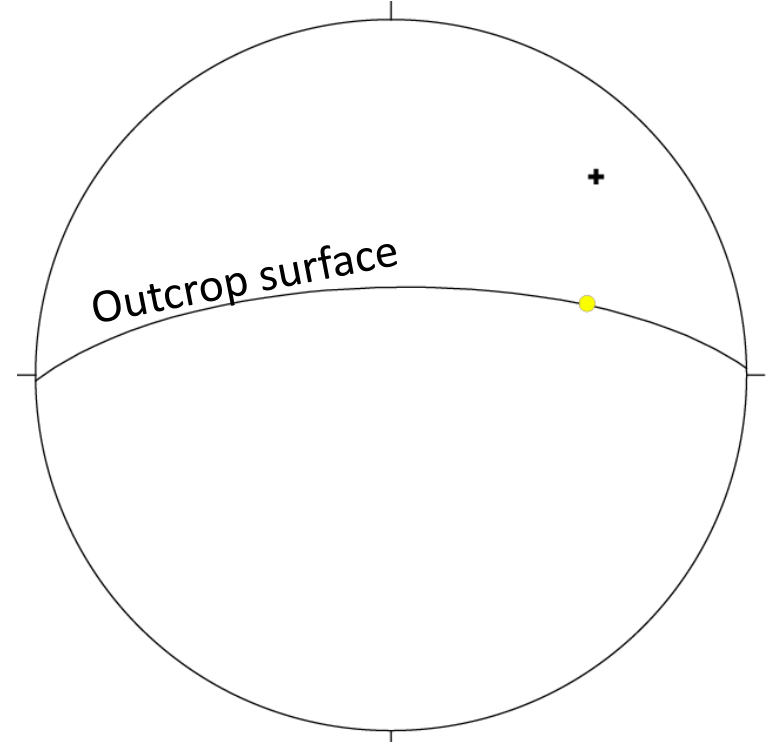- Orientation
- Overprinting

Understand geometry in 3D

089 ←——————→

S_0

F_1 hinge/axis S_1 B_{S_0}
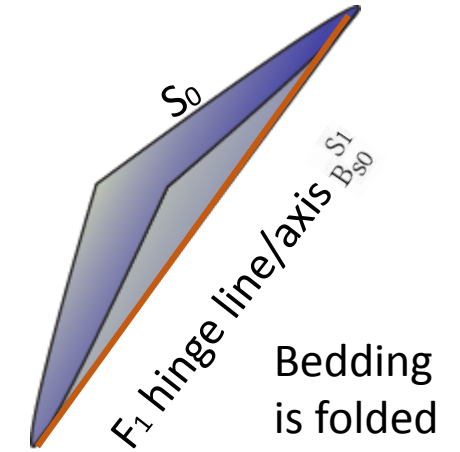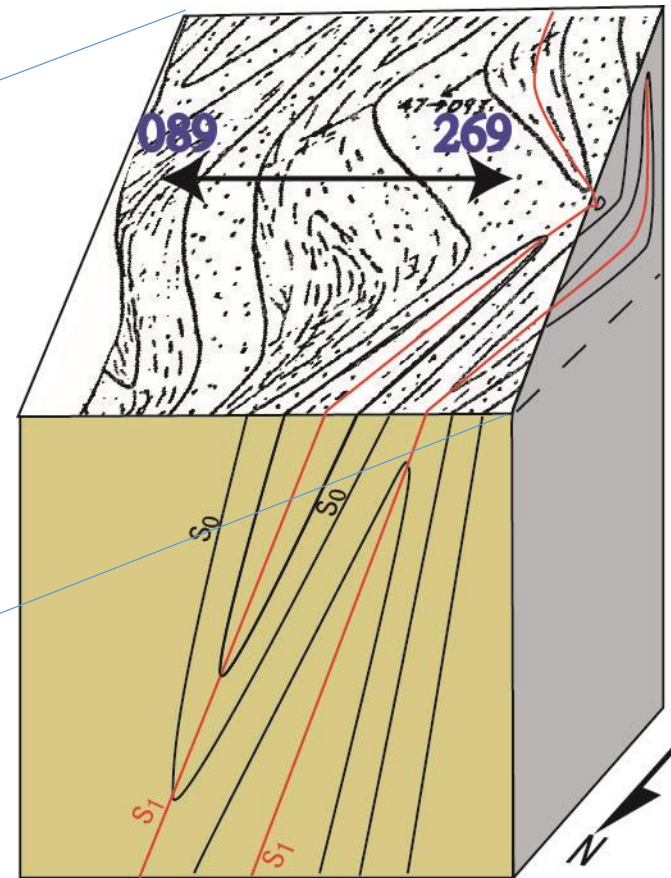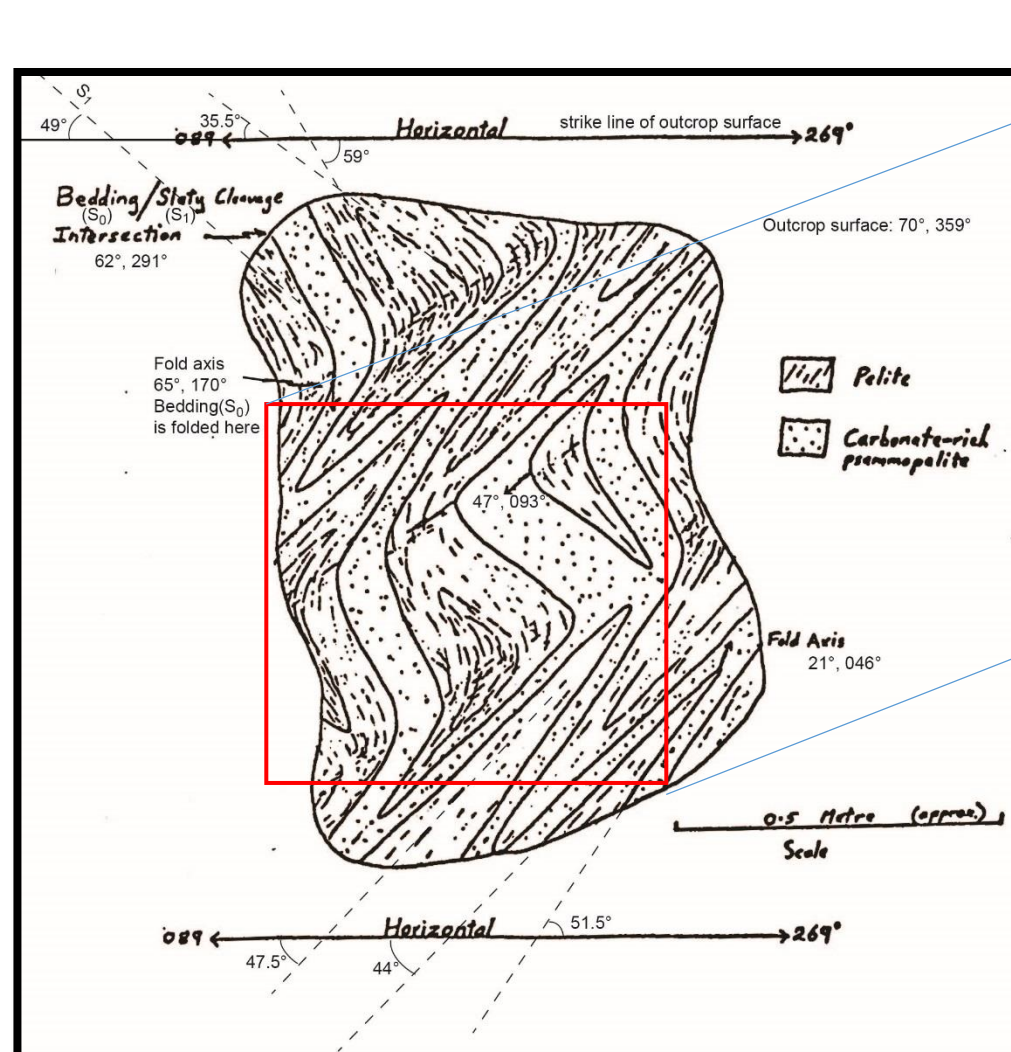
S_0 pitches 44 E on the outcrop surface (70, 359)

How to determine current F1 orientation on one limb of F2 fold?

The yellow line is on the dark blue limb of F1
Determine its orientation first

089 ←———— 269 ——————→

Intersection
62°, 291°

Fold axis
65°, 170°
Bedding(S_0)
is folded here

47°, 093°

Pelite

Carbonate-rich psammopelite

Fold Axis
21°, 046° F_1 axis: 21, 046

0·5 Metre (approx)
Scale

089 ← (S1) Horizontal 51.5° →269°
47.5° 44°

Outcrop surface

+
⬤

089

S_0

S_1 B_{S0}

F_1 hinge/axis

The dark blue F1 limb (S_0) orientation is completely defined by the yellow line and the F1 hinge line

Pitch 44 E on the outcrop surface (70, 359)

089 269

S_0

S_0

S_1

S_1

N

49° 35.5° Horizontal strike line of outcrop surface 269°
089 59°

Bedding/Slaty Cleavage
Intersection
62°, 291°

Outcrop surface: 70°, 359°

Fold axis
65°, 170°
Bedding (S_0)
is folded here

47°, 093°

Pelite

Carbonaterial
psammopelite

Fold Axis
21°, 046°

0·5 Metre (approx.)
Scale

S_0 (one of F1 limb) on NE-striking limbs of F2
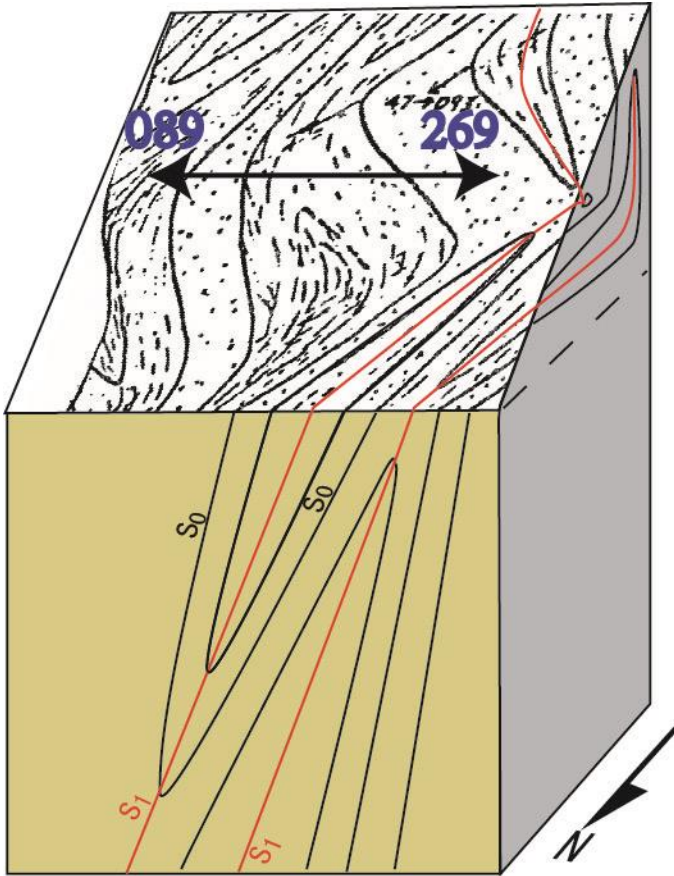
S_1
B_{S0}
+

Outcrop surface

S_0

Similarly the current light blue F1 limb (S_0) orientation and the S1 orientation on this limb of F2 can be determined using equal-area projection
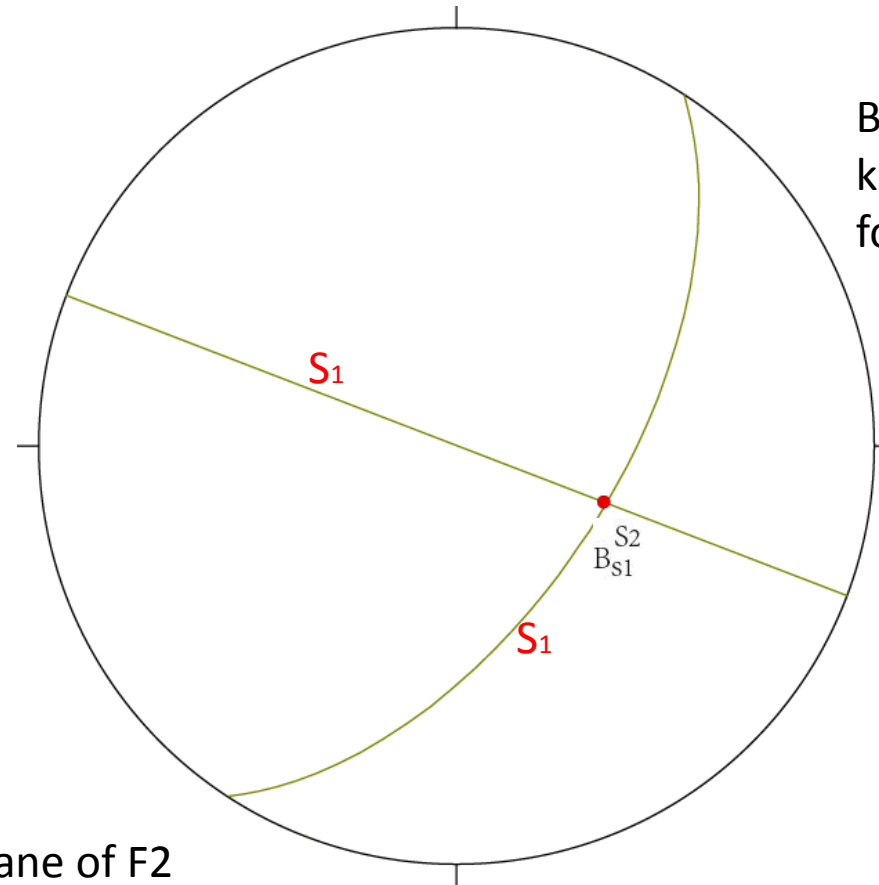
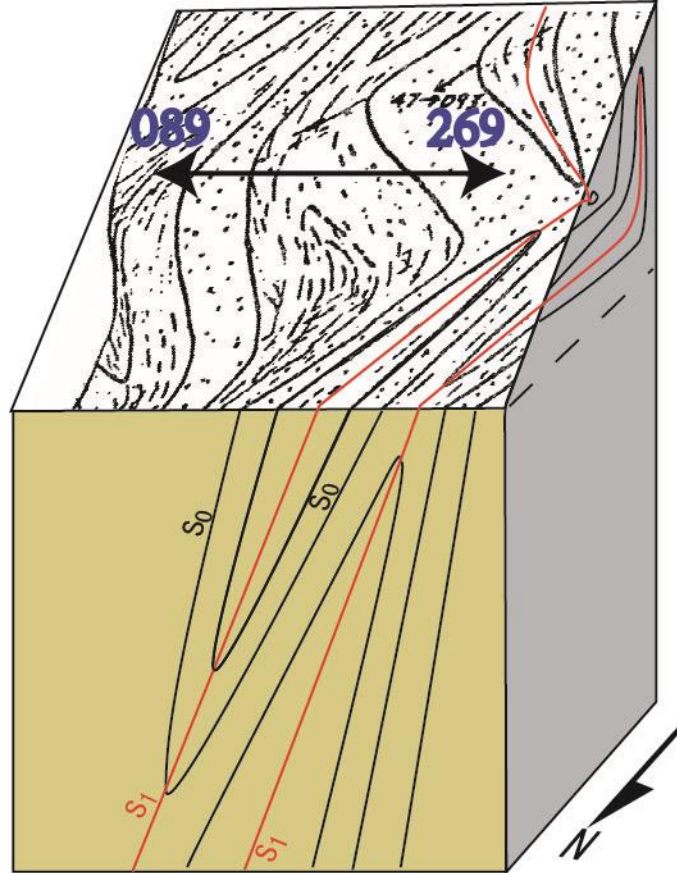# How to determine F1 (initial) orientation before F2 folding?

Look at S1 first

Before the F_2 folding, S1 strikes 360°. So we know one line orientation before the F_2 folding.
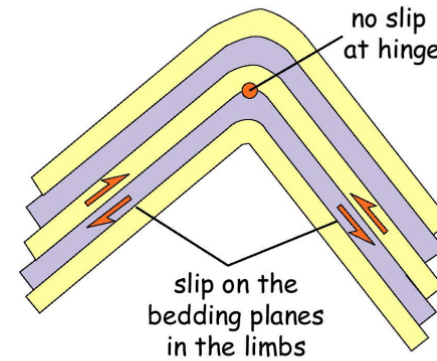

089   269

S_0 S_0

S_1 S_1

N

S_1

S_1

S2
B_{s1}

S_2: axial plane of F2

S1 current orientations

089   269

47 70°E

S0   S0

S1   S1

N

During F2 folding, S0 and S1 were folded

Flexural slip

no slip at hinge

slip on the bedding planes in the limbs

return to menu

From internet

Are there any lines do not change their orientations during F2 folding?
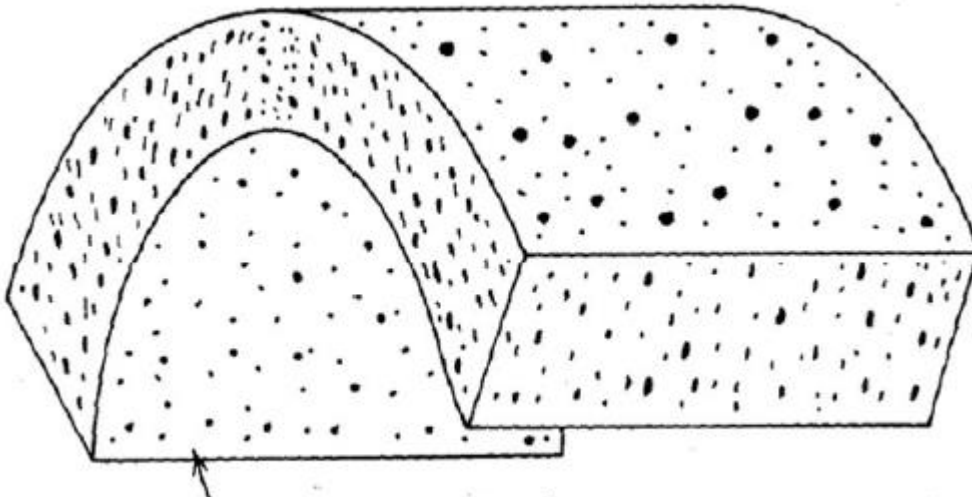
Flexural flow/slip:
No strain on slip surfaces

Lines on slip surface just rotate around the fold hinge line